

CLAIMS

1. A voltage generating apparatus comprising:

an input terminal;

5 an output terminal;

a slow discharging amplifier connected between said input terminal and said output terminal;

10 a rapid charging amplifier connected between said input terminal and said output terminal; and

15 a first offset voltage generating element connected between said input terminal and one of said slow discharging amplifier and said rapid charging amplifier, so that an input voltage applied to said slow discharging amplifier is higher than an input voltage applied to said rapid charging amplifier.

2. The voltage generating apparatus as set forth in claim 1, further comprising a resistor, connected between said slow discharging amplifier and said output terminal.

3. The voltage generating apparatus as set forth in claim 1, wherein said slow discharging amplifier comprises a first single-end output circuit along with an oscillation avoiding capacitor, and said rapid charging amplifier comprises a second single-end output circuit without an oscillation avoiding capacitor.

25 4. The voltage generating apparatus as set forth in claim 1, further comprising:

a rapid discharging amplifier connected between said input terminal and said output terminal; and

30 a second offset voltage generating element connected between said input terminal and one of said slow discharging amplifier and said rapid discharging amplifier, so that the input voltage applied to said slow discharging amplifier is lower than an input voltage applied to said rapid

discharging amplifier.

5. The voltage generating apparatus as set forth in claim 4, wherein said rapid discharging amplifier comprises a third single-end output circuit without an oscillation
5 avoiding capacitor.

6. The voltage generating apparatus as set forth in claim 4, wherein said rapid discharging amplifier and said slow discharging amplifier are constructed by a single discharging amplifier,

10 said single discharging amplifier including switches controlled by control signals, so that said single discharging amplifier serves as said rapid discharging amplifier when said control signals are in a first mode and said single discharging amplifier serves as said slow
15 discharging amplifier when said control signals are in a second mode.

7. The voltage generating apparatus as set forth in claim 4, wherein said second offset voltage generating element is incorporated into said single discharging amplifier.

20 8. The voltage generating apparatus as set forth in claim 4, further comprising:

a first switch connected between said slow discharging amplifier and said output terminal;

25 a second switch connected between said rapid discharging amplifier and said output terminal; and

a third switch connected between said rapid charging amplifier and said output terminal,

30 said first, second and third switches being controlled so that said slow discharging amplifier, said rapid discharging amplifier and said rapid charging amplifier are selectively activated.

9. A voltage generating apparatus comprising:

an input terminal;

an output terminal;
a rapid discharging amplifier connected between said input terminal and said output terminal;
a slow charging amplifier connected between
5 said input terminal and said output terminal; and
a first offset voltage generating element connected between said input terminal and one of said rapid discharging amplifier and said slow charging amplifier, so that an input voltage applied to said rapid discharging
10 amplifier is higher than an input voltage applied to said slow charging amplifier.

10. The voltage generating apparatus as set forth in claim 9, further comprising a resistor, connected between said slow charging amplifier and said output terminal.

15 11. The voltage generating apparatus as set forth in claim 9, wherein said rapid charging amplifier comprises a first single-end output circuit without an oscillation avoiding capacitor, and said slow charging amplifier comprises a second single-end output circuit along with an
20 oscillation avoiding capacitor.

12. The voltage generating apparatus as set forth in claim 9, further comprising:

a rapid charging amplifier connected between said input terminal and said output terminal; and

25 a second offset voltage generating element connected between said input terminal and one of said slow charging amplifier and said rapid charging amplifier, so that the input voltage applied to said slow charging amplifier is higher than an input voltage applied to said rapid charging
30 amplifier.

13. The voltage generating apparatus as set forth in claim 12, wherein said rapid charging amplifier comprises a third single-end output circuit without an oscillation

avoiding capacitor.

14. The voltage generating apparatus as set forth in claim 12, wherein said rapid charging amplifier and said slow charging amplifier are constructed by a single charging
5 amplifier,

said single charging amplifier including switches controlled by control signals, so that said single charging amplifier serves as said rapid charging amplifier when said control signals are in a first mode and said single
10 charging amplifier serves as said slow charging amplifier when said control signals are in a second mode.

15. The voltage generating apparatus as set forth in claim 12, wherein said second offset voltage generating element is incorporated into said single charging amplifier.

16. The voltage generating apparatus as set forth in claim 12, further comprising:

a first switch connected between said slow charging amplifier and said output terminal;

a second switch connected between said rapid
20 discharging amplifier and said output terminal; and

a third switch connected between said rapid charging amplifier and said output terminal;

25 said first, second and third switches being controlled so that said slow charging amplifier, said rapid discharging amplifier and said rapid charging amplifier are selectively activated.

17. A voltage generating apparatus comprising:

an input terminal;

an output terminal;

30 a rapid discharging amplifier connected between said input terminal and said output terminal;

a slow discharging amplifier connected between said input terminal and said output terminal;

a rapid charging amplifier connected between said input terminal and said output terminal;

5 a first offset voltage generating element connected between said input terminal and one of said rapid discharging amplifier and said slow discharging amplifier, so that an input voltage applied to said rapid discharging amplifier is higher than an input voltage applied to said slow discharging amplifier; and

10 a second offset voltage generating element connected between said input terminal and one of said slow discharging amplifier and said rapid charging amplifier, so that the input voltage applied to said slow discharging amplifier is higher than an input voltage applied to said rapid charging amplifier.

15 18. A voltage generating apparatus comprising:

an input terminal;

an output terminal;

a rapid discharging amplifier connected between said input terminal and said output terminal;

20 a slow charging amplifier connected between said input terminal and said output terminal;

a rapid charging amplifier connected between said input terminal and said output terminal;

25 a first offset voltage generating element connected between said input terminal and one of said rapid discharging amplifier and said slow charging amplifier, so that an input voltage applied to said rapid discharging amplifier is higher than an input voltage applied to said slow charging amplifier; and

30 a second offset voltage generating element connected between said input terminal and one of said slow charging amplifier and said rapid charging amplifier, so that the input voltage applied to said slow charging amplifier is

higher than an input voltage applied to said rapid charging amplifier.